

## APPENDIX C

### Proposed Evaluation of Patients With Normal Spirometry

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**EVALUATION FOLLOWS ON PAGE 356**

## Proposed Evaluation of Patients With Normal Spirometry

Normal Spirometry	Considerations
<b>Spirometry Post-BD</b> →	Review spirometry for reduction in FEV <sub>1</sub> ; 12% increase post-BD diagnostic of AHR
<b>Spirometry w/ Symptoms</b> →	Intermittent nature of asthma may require repeat spirometry when patients are symptomatic
<b>Chest Radiograph</b> →	Will be normal in most patients; helpful to eliminate pulmonary infiltrates, effusions, or mediastinal disease
<b>Complete Blood Count</b> →	Rule out anemia, especially in females
<b>Inspiratory FVL</b> →	Review the inspiratory FVL on all spirometry examinations for truncation or flattening
<b>Exercise Larynoscopy</b> →	Presence of abnormal FVL or history of inspiratory wheezing or noisy breathing; diagnostic for vocal cord dysfunction
<b>Bronchoprovocation Testing</b> →	With normal spirometry, important to rule out underlying airway reactivity, such as EIB
<b>Methacholine</b> →	Most common test used for AHR, with good negative predictive value; diagnostic for EIB with associated exercise symptoms
<b>Mannitol</b> →	Newest modality with equivalence to methacholine; requires 15% decrease in FEV <sub>1</sub>
<b>Eucapnic Hyperventilation</b> →	Equivalent to methacholine for diagnosing AHR, but requires a 15% decrease in FEV <sub>1</sub>
<b>Exercise Spirometry</b> →	Poor predictability compared with other methods and may not reproduce symptoms in laboratory setting
<b>Impulse Oscillometry</b> →	Newer modality that measures airway resistance and may identify AHR based on reduction in post-BD values
<b>High-Resolution CT</b> →	May identify subclinical lung disease, airway trapping, or bronchiectasis; low diagnostic yield in this population
<b>Cardiopulmonary Exercise Testing</b> →	Primarily used to assess patient's ability to exercise and measure VO <sub>2max</sub> ; given limited reference values and low suspicion for cardiac disease, it may not identify specific cause
<b>Allergy Evaluation</b> →	Consideration for allergy testing in patient with other atopic symptoms, such as atopic dermatitis and allergic rhinitis
<b>Cardiology Evaluation</b> →	Very low likelihood of cardiac disease in a younger population; referral should be based on physical examination findings
<b>Electrocardiogram</b> →	Numerous nonspecific changes found in younger population and are rarely diagnostic
<b>Echocardiogram</b> →	In the absence of physical findings, it is not routinely warranted unless there are concerns for valvular disease or PH

Proposed evaluation of patients with normal spirometry. There is no single approach to evaluating the young patient with dyspnea and normal spirometry. Most consideration should be given to establishing the presence or absence of airway hyperactivity and upper airways disorders (eg, vocal cord dysfunction), and ruling out parenchymal lung disease.

AHR: airway hyperresponsiveness; BD: bronchodilation; CT: computed tomography; EIB: exercise-induced bronchospasm; FEV<sub>1</sub>: forced expiratory volume in 1 second; FVL: flow volume loop; PH: pulmonary hypertension; VO<sub>2max</sub>: maximal oxygen consumption; w/: without

Illustration: Reproduced with permission and minor changes from Zanders TB, Lucero PF, Bell DG, et al. San Antonio Military Medical Center (SAMMC): standardized evaluation of post-deployment dyspnea. Presented at: CHEST 2012 Centers of Excellence, Atlanta, GA, October 22–25, 2012.